TS507

High Precision Rail-to-Rail Operational Amplifier

PRELIMINARY DATA

- **Ultra low offset voltage: 60µV max**
- **Rail-to rail input/output voltage swing**
- **Operating from 2.7V to 5.5V**
- **High-speed: 2.2MHz**
- **Low consumption: 0.85mA**
- **Supply voltage rejection ratio: 85dB**
- **ESD protection 2kV**
- **Latch-up immunity**
- **Available in SOT23-5 micropackage**

Description

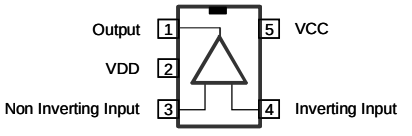
The TS507 is a high performance rail-to-rail output amplifier with very low offset voltage. This amplifier uses a new trimming technique that yields ultra low offset voltages without any need for external nulling.

The circuit presents very stable electrical characteristics over the entire supply voltage range, and is particularly intended for professional and telecom applications.

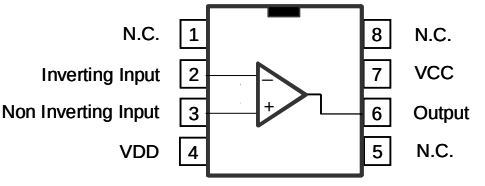
The TS507 is housed in the space-saving 5 pins SOT23 package that makes it well suited for battery-powered systems. This micropackage simplifies the PC board design because of it's ability to be placed in tight spaces (outside dimensions are: 2.8mm x 2.9mm)

Pin Connections (top view)

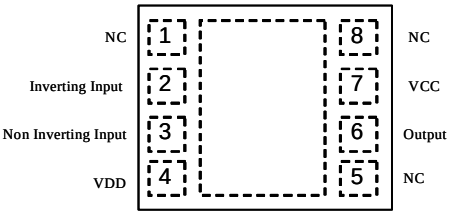
TS507ILT



TS507ID-TS507IN-TS507IST



TS507IQT



Applications

- **Precision filters**
- **Transformer/line drivers**
- **Personal entertainments (CD players)**
- **Portable communication (cell phones, pagers)**
- **Instrumentation & sensoring**

Order Codes

Part Number	Temperature Range	Package	Packaging	Marking
TS507IN	-40, +125°C	DIP	Tube	
TS507ID/TS507IDT		DIP	Tube or Tape & Reel	
TS507IST		mini SO	Tape & Reel	
TS507ILT		SOT23-5	Tape & Reel	TBD
TS507IQT		DFN	Tape & Reel	

1 Absolute Maximum Ratings

Table 1: Key parameters and their absolute maximum ratings

Symbol	Parameter	Value	Unit
VCC	Supply voltage [1]	6	V
Vid	Differential Input Voltage [2]	±5.5	V
V_{in}	Input Voltage [3]	Gnd to Vcc	V
T_{oper}	Operating Free Air Temperature Range	-40 to +125	°C
Tstg	Storage Temperature Range	-65 to +150	
T_j	Maximum Junction Temperature	150	°C
Rthjc	Thermal Resistance Junction to Case [4] SOT23-5 SO8 DIP8	 81 28 80	°C/W
Rthja	Thermal Resistance Junction to Ambient - SOT23-5	256	°C/W
ESD	Human Body Model	2	kV
	Lead Temperature (soldering, 10sec)	260	°C

1) All voltage values, except differential voltage are with respect to network ground terminal.

2) Differential voltages are the non-inverting input terminal with respect to the inverting input t erminal.

3) The magnitude of input and output voltages must never exceed V_{CC} +0.3V.

4) Short-circuits can cause excessive heating and destructive dissipation.

Table 2: Operating Conditions

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	2.7 to 5.5	V
V_{icm}	Common Mode Input Voltage Range	V_{DD} -0.2 to V_{CC} +0.1	V

2 Electrical Characteristics

Table 3: V_{CC}^+ = +5V, V_{DD}^- = 0V, T_{amb} = 25°C (unless otherwise specified) - Operational Amplifier

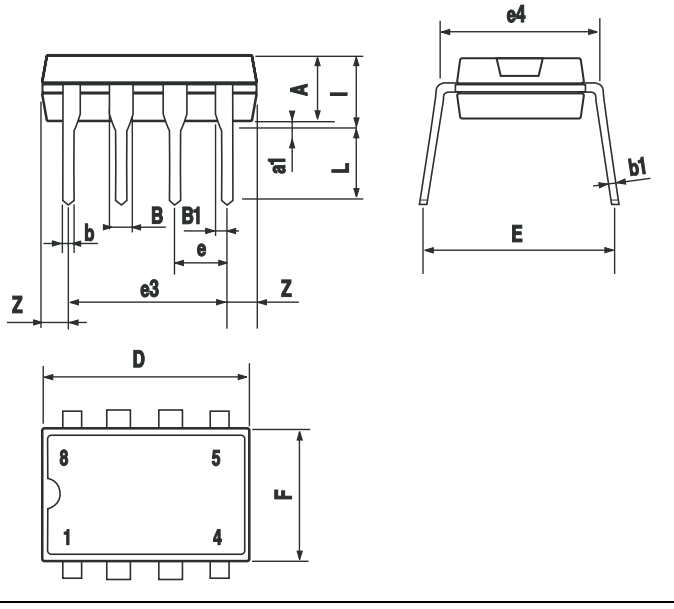
Symbol	Parameter	Min.	Typ.	Max.	Unit
I_{cc}	Supply Current		0.85		mA
I_{ib}	Input Bias Current $T_{min} \le T_{op} \le T_{max}$		50 TBD	150	nA
R_i	Input Resistance, f = 1kHz		1		MΩ
V_{io}	Input Offset Voltage $0V \le V_{CM} \le 3.5V$ $T_{min} \le T_{op} \le T_{max}$ $0V \le V_{CM} \le 5V$ $T_{min} \le T_{op} \le T_{max}$		0	60 100 300 350	µV
ΔV_{io}	Input Offset Voltage Drift $T_{min} \le T_{op} \le T_{max}$		0.3		µV/°C
I_{io}	Input Offset Current $T_{min} \le T_{op} \le T_{max}$		5	TBD TBD	nA
ΔI_{io}	Input Offset Current Drift $T_{min} \le T_{op} \le T_{max}$		0.08		$\frac{nA}{°C}$
I_{os}	Output Short Circuit Current		50		mA
A_{vd}	Large Signal Voltage Gain R_L = 2kΩ $1V \le V_{out} \le 4V$		125		dB
GBP	Gain-bandwidth Product, f = 100kHz		2.2		MHz
e_n	Equivalent Input Noise Voltage, f = 1kHz Rs = 1kΩ		12		$\frac{nV}{\sqrt{Hz}}$
THD	Total Harmonic Distortion A_v = 20dB R_L = 2kΩ $V_o = 2V_{pp}$ f = 1kHz		TDB		%
$\pm V_{opp}$	Output Voltage Swing R_L = 2kΩ	TBD			V
V_{opp}	Large Signal Voltage Swing R_L = 10kΩ f = 10kHz		TBD		V_{pp}
SR	Slew Rate Unity Gain, RL = 2kΩ		0.65		V/µs
PSRR	Power Supply Rejection Ratio		100		dB
CMRR	Common Mode Rejection Ratio V_{ic} = 0V to 3.5V V_{ic} = 0V to 5V		125 94		dB

3 Package Mechanical Data

3.1 DIP-8 Package

Plastic DIP-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.6	0.017		0.063

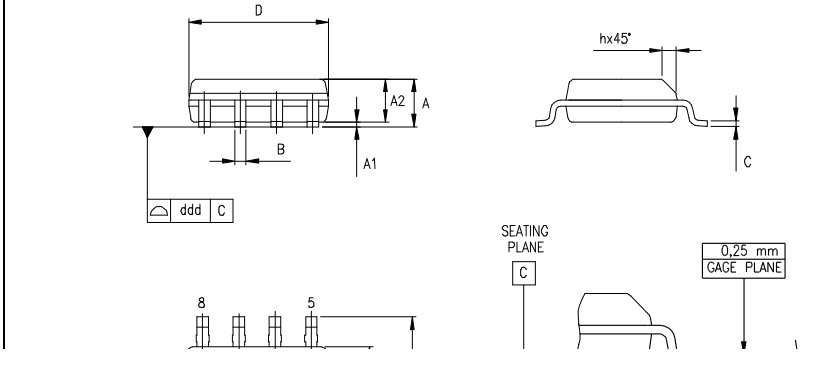


P001F

3.2 SO-8 Package

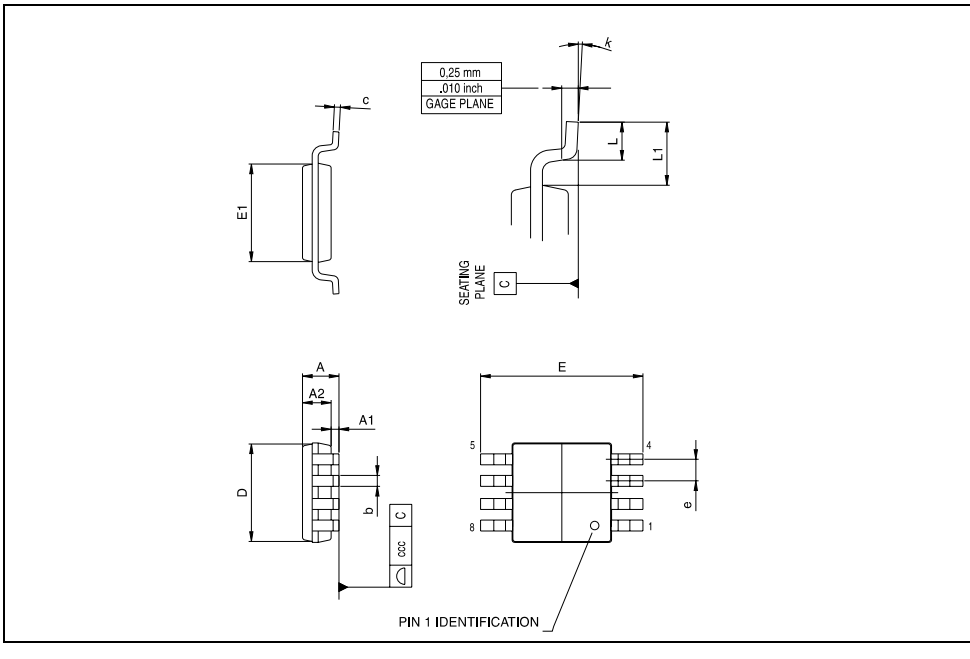
SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



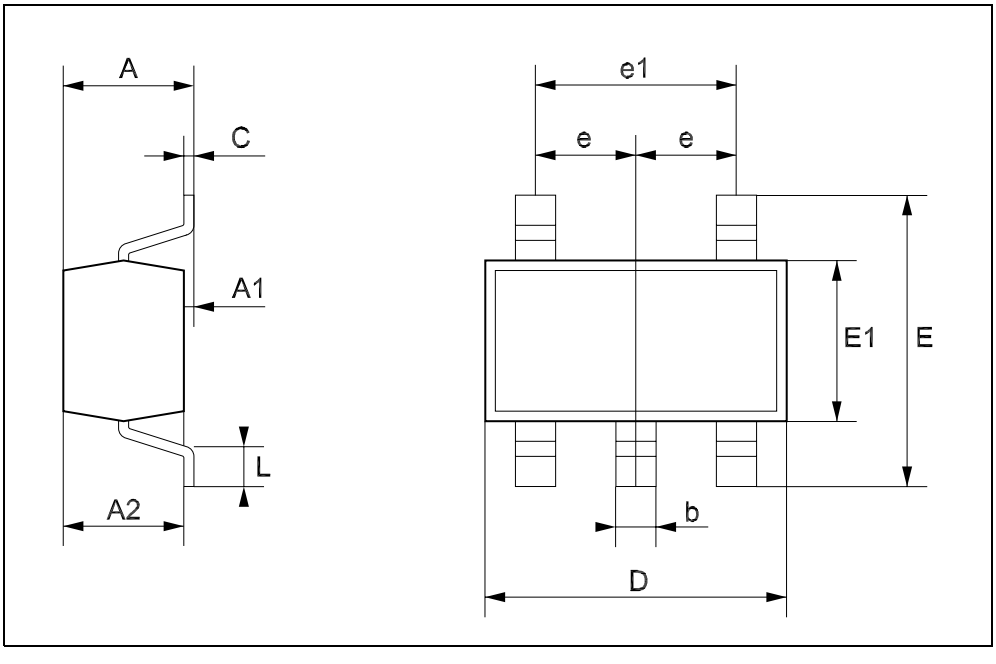
3.3 Mini SO-8 Package

miniSO-8 MECHANICAL DATA						
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.1			0.043
A1	0.05	0.10	0.15	0.002	0.004	0.006
A2	0.78	0.86	0.94	0.031	0.031	0.037
b	0.25	0.33	0.40	0.010	0.13	0.013
c	0.13	0.18	0.23	0.005	0.007	0.009
D	2.90	3.00	3.10	0.114	0.118	0.122
E	4.75	4.90	5.05	0.187	0.193	0.199
E1	2.90	3.00	3.10	.0114	0.118	0.122
e		0.65			0.026	
K	0°		6°	0°		6°
L	0.40	0.55	0.70	0.016	0.022	0.028
L1			0.10			0.004



3.4 SOT23-5 Package

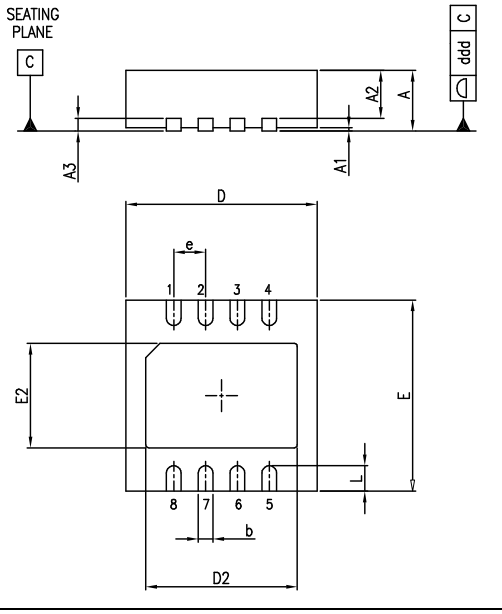
SOT23-5L MECHANICAL DATA						
DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.15	0.0		5.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	2.60		3.00	102.3		118.1
E1	1.50		1.75	59.0		68.8
e		0.95			37.4	
e1		1.9			74.8	
L	0.35		0.55	13.7		21.6



3.5 DFN8 Package

DFN8 (3x3) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	0.80	0.90	1.00	31.5	35.4	39.4
A1		0.02	0.05		0.8	2.0
A2		0.70			27.6	
A3		0.20			7.9	
b	0.18	0.23	0.30	7.1	9.1	11.8
D	2.875	3.00	3.125		118.1	
D2	2.23	2.38	2.48	87.8	93.7	97.7
E	2.875	3.00	3.125		118.1	
E2	1.49	1.64	1.74	58.7	64.6	68.5
e		0.50			19.7	
L	0.30	0.40	0.50	11.8	15.7	19.7



4 Revision History

Date	Revision	Description of Changes
01 Oct 2004	1	First Release